SVAT modelling of crop physiological response to drought in potatoes under different types of deficit irrigation

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ABSTRACTS

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L 2.03 - SVAT modeling of crop physiological response to drought in potatoes under different types of deficit irrigation

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Further understanding of the crop physiologic responses to drought caused by deficit irrigation (DI), regular or partial root drying (PRD), have been obtained in several studies in tomatoes and potatoes under controlled environment. The improved quantitative description of the production of abscisic acid in the root system and as well as its influence on stomatal regulation of gas exhange has been implemented in the Daisy model, a comprehensive work partly financed by the SAFIR project (www.safir4eu.org). Hence, the improved Daisy model now calculates crop production based on gas exchange (CO_2 and H_2O) from the canopy configured as a big leaf with sun and shade compartments where the gas exchange in its basics is described according to the theory of Farquhar and Ball-Berry, but further modified to include effects of ABA signaling. The Daisy model has as well been further developed to include 2D root development, water and nitrogen uptake to enable studies of the effect of PRD/DI on improving water-use- efficiency. The present paper presents the new processes implemented in Daisy, and a comprehensive test of the model against data obtained under field conditions. Preliminary results show some discrepancies between modeled and measured ABA production, probably due to the fact that the latter was obtained from pot experiments. Further, the modeling work show a reasonable fit to measured 2D soil water content, but further refinement of the model is needed to explain water flow in a potato ridge system, which in fact is a 3D structure.